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Australian Society for Limnology Inc

NEWSLETTER

Volume 34 Number 4

December 1996

Includes the 1996 Membership Directory

Registered by Australia Post

Print Post Publication No. PP381667/00125

ISSN 1037-2512

AUSTRALIAN SOCIETY FOR LIMNOLOGY INC.

The Australian Society for Limnology Inc. (ASL) is an association of over 500 people with professional or amateur interests related to Australian inland waters. Since its inception in 1961, the society has played an important role in fostering limnology in this country. The ASL promotes liaison between limnologists in academic, government and private institutions and has a vested interest in the conservation of aquatic and related resources. Annual conferences are held near centres of limnological interest, and the programme includes scientific sessions, field excursions and social activities.

The ASL regularly produces a newsletter with notes on limnological activities, articles of interest, book reviews and announcements of upcoming events likely to be of interest to Members.

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Membership Infomation and a list of the Regional Executive Officers can be found at the back of this Newsletter

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Material for publication in the March 1997 Issue of the Newsletter should be sent to the Editor (see back pages) before 31st March 1997.

Long articles should be forwarded as unformatted text on a disk or via email.

This Newsletter is printed by ETU Publications,
The University of Adelaide.

EDITORIAL

This editorial comes to you from the Limnological State as most of South Australia sits under a vast shallow sheet of water. The statement of the week came from someone on a station near William Creek in South Australia's north; the police were attempting to evacuate them but they refused to go, saying they had not seen rain in three years and no-one was going to take them away from the beautiful sight of sitting in their homestead surrounded by an ocean. Again this vision contrasts strongly with the continual media reports of 'disaster' and 'disaster relief' from flooding, and the millions it will cost the government in repairs. Hardly ever in the popular press do we hear of the overriding benefits that flooding brings. I am sure that the people of Charleville, despite the hardships encountered during the flood, will be harvesting the increased productivity from the Warrego floodplain in no time.

This issue of the Newsletter contains the 1996 ASL Membership Directory, names are in alphabetical order. If you find your details are incorrect send the changes to the Membership Officer or hang onto them and there will be a Directory update form in the September Newsletter.

DEADLINES FOR THE NEWSLETTER IN 1997

The following are the deadlines for issues of the ASL Newsletter Volume 35.

Volume	Deadline
Volume 35	
March 1997, *No. 1*	31st March 1997
June 1997, *No. 2*	30th June 1997
September 1997, *No. 3*	30th September 1997
December 1997, *No. 4*	31st December 1997

--ASL Home Page Address--
http://www.ntu.edu.au/science/mdouglas/asl_home.html

FROM THE PRESIDENT

A FEW ASL ISSUES AND SOME THOUGHTS ON SCIENCE AND DATA.

In the last issue of the Newsletter I mentioned our efforts to extract information from interested ASL members on the future of the Society. This process is underway and we hope to circulate a first draft of ideas well in advance of the next Congress. Feel free to contact members of the Executive with your own ideas and queries.

The recent identification of FASTS Top Ten Issues for science in Australia *(see News from FASTS Section)* gives this move greater urgency. Included in the Top Ten calls are A National Vision for Australian Science, Restructuring of Australia's Universities and further development of Basic Science. At this stage it would seem very unlikely that ASL as a group could contribute much to these issues. When Paul Boon and others raised a few questions about the future of ASL it was done within the context of how can ASL contribute to nationally important issues. Given the FASTS initiatives (and our financial contribution to FASTS) our moves are timely, but could stall unless we get feedback and input from the membership.

****

In the Top End we have just experienced a record 24 hourly rianfall of 311 mm as a cyclone passed by on its way down the west coast. Besides threatening to disrupt the wedding of Abbie Spiers from ERISS (bride and groom stranded on different sides of the raging floodwaters!) the downpour raised questions about our knowledge of wetland flooding. In all truthfulness we do not know how much "wetland" we actually have! And do we know what affect the raging flows in the rivers and streams have on the biota? We can surmise and for some questions this may provide an adequate information base. Or does it? In my mind this raises the often poorly addressed question of how much data is necessary in order to provide an adequate information base for management?

Thus, we the hit the perennial question of how much basic and applied research do we currently fund and should fund? But, it also raises a further question of how effectivley are we using our existing data and knowledge? Many scientists do not seem to like to sit down and collate and summarise or even reinterpret existing information; they like to obtain new and more accurate data. If we are to provide relevant information and thereby justify our claims for more funding do we need to reconsider our attitudes and the balance between obtaining and using information? My response is very much in favour of a greater and more effective usage of existing knowledge, but I know fullwell that many of my immediate colleagues do not fully agree.

FASTS is calling for more basic science and a restructuring of our universtities. Does this or should this include active steps by all scientists to ensure that their data and knowledge is either made available or used in the most effective manner? I doubt that we actually do this at the moment and would like to see a greater institutional effort and personal responsibility to make sure our information does get to the appropriate fora. Can ASL contribute or do we already do our little bit?

****

The record rainfall event in the Top End also raises a question of how we deal with episodic or catastrophic events? We can not keep measuring forever and my experiences with GCMs suggests that modelling complex systems (eg global methane cycles) does not yet provide an overly reliable answer. Plus, when the big event hits we seem to duck for cover and not attempt to obtain that significant point on our graph. Should we even bother, afterall, we know that something big has happened; do we need to actually measure it, especially when it is really not a fun thing to do?

Max Finlayson
ASL President 96/97

PRATTLEBUT, SCUMOUR AND RUTTLE

NEW SOUTH WALES

Australian Water Technologies EnSight.

Bruce Chessman (DL&WC) and **Jane Growns** (CRCFE) have left AWT and we wish them all the best in their new positions. **Ivor Growns** has also moved to Albury and is working in space provided by the La Trobe University Wodonga. Since the last correspondence we have seen the arrival of **Greg White** previously from DL&WC, **Lynda Blundan** (UNE), and **Brendan McKie** (ANU). **Brendan** will be working with the newly wed **Cathy Cunningham** on **Ivor's** IFIM study and **Greg** will be coordinating the wetland group.

Lynda and **Brendan Atkins** have been conducting a biological assessment of a number of constructed wetlands for Holroyd Council in Sydney. It has been reported that **Lynda** is missing in action and was last seen flying around the bright lights of the city. **Brendan** has also been coordinating the development of the business and recently won the position of senior consultant.

Peter Swanson has submitted his masters thesis on constructed wetlands (Wooha), and is currently lounging around with **Merran Griffith** and **Cathy Hooper** waiting for rain, so as to continue their storm event water quality assessment of the Shoalhaven and Hawkesbury-Nepean Catchments.

Paul McEvoy, **Nimal Chandrasena**, and **Joe Pera** have been working furiously assessing the rehabilitation of the Botany wetlands. The rehabilitation program has required a super human effort and **Paul** and **Nimal** have been seen walking on water (mats of *Ludwigia peruviana*). **Joe** has been telling many a fishing yarn, typically the size of his fish, and trying to find ways to market the abundant carp that he has caught.

Amanda Kotlash, and **Paul** are also working with Ivor on the environmental flow program for the Hawkesbury River.

Colin Besley (another newly wed), **David Holleley**, **Mark Hopkins**, **Ryan Tracey**, **Lisa Silva** and **Simon Williams** have been busily conducting macroinvertebrate studies in urban stream in Sydney. Most of the team have had difficulties looking you in the eye, as they have that crazed stare that comes with endless hours behind a microscope. However, with **David** its the way he normally looks. **Simon** and **Colin** have also been analyzing the 3 years of Hawkesbury macroinvertebrate data, but have been seen to be talking more about their recent holidays. The analysis and

reporting of the macroinvertebrate biodiversity study of Western Sydney has been completed and should be released by NSW NP&WS early in 1997.

Leonard Pinto has been on leave for a number of months and resuming some estuarine fisheries contacts in Sri Lanka.

In December, **Nick O'Conner** visited to give us more information on skills and capabilities of Water Ecoscience and discussed ways organizations can work together as subsidiaries of AWT.

Finally, all the bug staff are looking forward to bothering **John Hawking** with obscure questions at the forthcoming taxonomic workshop.

SOUTH AUSTRALIA

Australian Water Quality Centre (a business unti of the SA WATER Corporation) based at the Bolivar Laboratory.

In the macroinvertebrate area at the AWQC the workforce is expanding again. **Trevor Green** has become a permanent member of the group after being on a trial period from redeployment. Another new biologist will hopefully start at hte beginning of March with the Monitoring River Health team of **Chris Madden** and **Vladimir Tsymbal**. With **Peter Goonan** of the EPA, **Chris** and **Vlad** are currently selecting the 200 new sites that are to be sampled this year in South Australia as a test of the models produced from the reference sites sampled in 1994 and 1995. With sorting still to be done from these initial surveys and three months of field work beginning in April, a third pair of eyes will be required to keep ahead of the deadlines.

Peter Schultz is feeling like he is a school teacher again with several reports to be completed before he goes on holidays. The reports are about the effect of Heathfield and Hahndorf Wastewater Treatment Plantson the rivers receiving effluent and the effect of feral plant removal on the Torrens River. **Peter** will then be viewing some "real" rivers (a most unpatriotic view) on the north coast of NSW. He and **Trevor Green** have also been to the south-east of SA to start new projects on the Millicent and Naracoorte WWTPs and made a couple of trips to Murtho on the Murray to put in artificial substrates-the flood before Christmas made the initial attempt somewhat pointless. Lake Bonney (South -East) and Brukunga mine on Dawesley Creek are two polluted systems that are being monitored. 1997 looks set to be a busy year at AWQC.

University of Adelaide
Department of Geography

The Geography labs are under a bit of pressure at the moment as more and more honours and post-grad students opt for limnological research (both modern and palaeo). Dec '96 saw the end of several very interesting honours projects. **Glenn Tassicker** was rewarded with an APA scholarship for his water quality and diatom biomonitoring work on the Torrens River. **Glenn** displayed his skills as a palaeolimnologist by recreating the history of pollution in the Torrens lake without any chronological control whatsoever. **Marie Illman** applied **Peter Gell's** salt lake diatom calibration set to a 5000 year diatom record at Lashmar's Lagoon on Kangaroo Island and traced dramatic changes in the lagoon's salinity. Her results have implications for the interpretation of the Aboriginal history of the island and their reliance on freshwater resources. **Anita Harmer** used a similar approach to trace recent salinisation in a small lake in Cooke's Plain alongside Lake Alexandrina. **Prue Tucker** examined sediment redistribution in the Coorong resulting from the discharge of turbid Lake Alexandrina water from the barrages. Amongst this years honours crew **Adam Sincock** will try to show how diatoms can reveal changes to the lower Goulburn to which **Dave Tiller's** (EPA, Melbourne) inverts were oblivious. Also, **Michelle Goody** will be looking into water quality issues in the reconstructed Onkaparinga wetlands, with an emphasis on heavy metals. PhD student **Jennie Fluin** continues to sample water and diatoms from everything puddle size or greater in SA for her nutrient calibration set. She plans to then use this data to quantitatively reconstruct the nutrient history of Lake Alexandrina. **Jennie** is also examining the role that Lake Alexandrina sediments play in nutrient cycling within the basin. **Peter Gell** and **Glenn Tassicker** are finalising the report for the Torrens Catchment Management Board on the history and sources of nutrients and sediment within the Torrens catchment in collaboration with **Tanya Dahlenburg** (1996 hons student), **Ian Rutherford** (CRC Monash) and **Peter Wallbrink** (CSIRO, Water Resources). **Peter** is also tackling diatom records from the Basin Lakes near Colac, Vic, to interpret in fine resolution palaoesalinity/palaeoclimate over the last 2000 years. He, **Jennie** and **Peter Tyler** (Deakin, Warrnambool) are hosting a diatom taxonomy workshop at Warrnambool in February with a view to integrating river diatom data sets being developed in SA and Victoria.

60 MINUTES

ASL Executive Teleconference, 9 Dec 1996

Present: R.Marchant, M.Finlayson, P.Boon, M.Hart, F. Sheldon, A.Chick, K.Muller, J.Jackson, N.O'Connor, P.Horwitz

1. **Finances**: M.Hart presented the balance sheet for Jan-July and Aug-Nov 1996. Most of the money going through the account was related to the Berri Congress. The profit from the congress is not finalised yet as money is still owed to the society by LWRRDC for running the Biomanipulation workshop.

2. **Biomanipulation workshop**: P.Boon informed the executive that a final report about the workshop had been submitted to LWRRDC with a request for payment of the outstanding $13000. The total cost of holding the workshop was estimated at $15000. (The ASL was given $25000 from LWRRDC to run the workshop, of which $12000 was received before the congress.) LWRRDC was happy with the report, a summary of which will appear in the next newsletter. The difficulties with staging the workshop indicated that the ASL should be circumspect when agreeing to hold such events. In particular, the executive needs to be convinced that those offering to run any part of a congress or workshop have the ability and resources to do so.

3. **CSIRO journals**: P.Boon has had discussions with A.Grant, editor of Marine and Freshwater Research, about publishing difficulties being experienced by the journal. P.Boon suggested to A.Grant that the society might be able to help by lobbying CSIRO and the Academy of Science, which jointly publish the journal. He is to have further discussions soon with A.Grant and will report back to the executive.

4. **Next ASL congress**: A.Chick reported that the accomodation, venue and catering for the next congress had been booked. The congress will be held in the Albury convention centre from Fri 26th Sept 1997 to Mon 29th Sept. The organising committee has yet to arrange sponsorship. It hopes to use the Albury Convention Bureau to handle registrations and bookings. Futher details will be advertised in the March 1997 newsletter.

5. **Future of ASL**: M.Finlayson will contact the executive groups that were set up after Berri to pursue this matter.

6. **Wetlands Alliance**: $200 has been donated to this group for each of the next three years. M.Finlayson will maintain contact with this group.

7. **Newsgroup**: M.Douglas has set up a newsgroup on the ASL homepage. Details of how to join

this group are in the latest newsletter.

8. **Newsletter**: F.Sheldon reported that the September issue had just been sent out. The December issue will largely consist of the membership directory. The March issue of 1997 should be sent out in April.

9. **FASTS**: It was suggested that the news items currently sent by FASTS to the secretary and president could be put on the ASL homepage for all interested members to see. The secretary will ask T.Gascoigne (FASTS executive director) to send news summaries to M.Douglas so this can be done.

10. **National Biodiversity Council**: P.Horwitz reported that the National Biodiversity Assembly that elects people to the National Biodiversity Council will be reconvened soon to consider nominations for election. R.Marchant and K.Muller volunteered to be ASL representatives on this assembly. It was suggested that about six ASL members be nominated for election.

11. **ASL wetland policy**: Copies of this document are still available. The policy has just been published in the newsletter. P.Horwitz will reconvene wetland committee and pursue any outstanding matters.

12. **Next executive meeting**: This will probably be in April or early May 1997.

ISSUES IN LIMNOLOGY

The section should be used for raising and debating various "Issues in Limnology"
The Issues raised in this section of the Newsletter are not necessarily the stated position of the ASL as a whole but reflect the view of one or more members. The person(s) raising the Issue are the spokesperson(s) for the Issue and their name, address and contact numbers (and email) are included at the end.

MINING THREAT TO COONGIE LAKES AND INNAMINKA RESERVE

HELP KEEP THE PETROLEUM INDUSTRY OUT OF COONGIE LAKES

Santos Ltd. has applied to the SA Minister of Mines (Dale Baker) for approval of the siesmic stage of planned petroleum exploration and extraction operations in the unique and fragile mosaic of lakes and ephemeral wetlands that is Coongie Lakes in the north-east of SA.

WE HAVE SAVED THIS AREA FROM COTTON FARMING NOW WE MUST FIGHT TO SAVE IT FROM MINING AND SHOW OUR GOVERNMENT THAT AUSTRALIANS, IN PARTICULAR AUSTRALIAN LIMNOLOGISTS, WILL NOT ALLOW DESTRUCTION OF WETLANDS WE HAVE AGREED TO PROTECT UNDER THE RAMSAR CONVENTION.

The SA Goverment refuses to order an EIS on Santos' plans.
No public consultation is intended.

Express your opposition.

Points to make in your letters and phone calls:

1. Protection of Coongie Lakes is a National Issue!! Let Santos know that their plans for Coongie Lakes are no more acceptable than those we rejected for the cotton growers.
2. Coongie Lakes are listed on the National Estate and on the Ramsar Convention for Protection of Wetlands of International Importance, the CSIRO (September, 1995) has confirmed them to be of World Heritage value.
3. Santos propose that only a "Declaration of Environmental Factors" (DEF) process under the Petroleum Act will occur and that approval will be given by Dale Baker. This is not a public process. This is not an assessment of the suitability of their proposal. This is not a decision making process. A DEF simply fine-tunes their proposed techniques. Santos assume "rights" to operate in Coongie Lakes from a non-public "mining Agreement" in 1988, and demand to exercise those rights.
4. Coongie Lakes is currently being assessed by the SA Department of Environment for its 'Wilderness Value" under the SA "Wilderness Protection Act". The potential

approvals to Santos would pre-empt the outcome of this Wilderness assessment. This must be prevented as Santos' proposal will destroy the Wilderness values of the area.

5. The public has a right to participate in informed decisions on the future of Coongie Lakes. A minimum assessment of Santos' proposal would require public and Parliamentary scrutiny, where the community sets the standards so as to prevent unacceptable impacts on the area, and include a full EIS.

PLEASE WRITE OR CALL THE FOLLOWING PEOPLE, AND YOUR LOCAL MEMBER OF PARLIAMENT.

LET THEM KNOW YOUR CONCERN.

Hon. John Olsen, The Premier of SA. Ph: 08 8226 3505.
State Admin. Centre, 200 Victoria Sq., Adelaide, SA 5000.
Ask him: Does he want to oversee the degradation of our remaining natural areas and the loss of our ecotourism assets?

Hon. Dale Baker, Minister of Mines Ph: 08 8226 2693
Parliament House, North Tce., Adelaide, SA 5000
Ask him: Why are there no intended credible assessment processes and public consultation for proposed operations of the industry for which he is responsible?

Hon. David Wotton, Minister for the Environment Ph: 08 8204 9377
9th Floor, Chesser house, 91 Grenfell St, Adelaide SA 5000
Ask him: When will he enforce current regulations to protect SA's natural heritage? Petroleum industry operations are incompatible with the statutory Plan of Management for the Coongie Lakes Control Zone of the Innamincka Regional Reserve, which states that the primary management objective is wetland management and wildlife conservation.

General Manager, Santos Ltd., Ph: 08 8218 5111
101 Grenfell St, Adelaide SA 5000.
Ask him: Why are Santos hiding their plans from the public? Why are they refusing to conduct an EIS?

ACF CALLS FOR THE COONGIE LAKES CONTROL ZONE TO BE DECLARED A NATIONAL PARK PROTECTED FROM MINING EXPLORATION AND EXTRACTION OPERATIONS.

FOR MORE INFO: ACF (Adelaide), 120 Wakefield St., Adelaide 5000.

The information presented here has been taken from an ACF Public Awareness Sheet.

Message created by Kerri Muller (kmuller@botany.adelaide.edu.au).

MORE SCIENTISTS!!

The Minister for Science has said that "Australia needs more scientists, technologists and engineers, not more doctors, lawyers and accountants."

Is there any evidence for this?

In which Science &Technology areas is the Australian education system failing to meet demand for graduates?

Send comments to Toss Gascoigne

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ARTICLES

ASL WETLANDS POLICY DOCUMENT

this information should have preceeded the Wetlands Policy Document that was published in the September 1996 Issue of the ASL Newsletter (Volume 34 Number 3)

The Wetland Policy Document arose out of a workshop held at the ASL congress at Jenolan Caves in 1995. The workshop discussed the need for the ASL to have a position statement on wetlands and their management, particularly in light of the Ramsar Conference which was to be held in Brisbane in March 1996. A working Group was established, consisting of Michele Barson, Deb Nias, Jenny Davis, Peter Schultz, Jane Chambers, Margaret Brock, Jane Roberts and Pierre Horwitz (convenor), and a teleconference between members of the group established the format: a policy document which portrayed the diversity of wetland types in Australia, their particular management requirements, and the ability of ASL members to contribute to both knowledge acquisition and management. The policy document would be designed to be short (A3 folded to four A4 sides), colourful and informative, and would need to be profesionally produced. Work on it commenced seriously in early January 1996. Many iterations and drafts, including advice and material sent by Paul Boon and Gillian Dunkerley, and feedback from ASL executive members, and more drafts, with final approval from the President to print and distribute, resulted in a final text which is presented below. The printed, full-colour document was tabled at Ramsar.

The Wetland Working Group will soon be dealing with the issue of 'What now - How do we promote the document, and encourage government agencies to act on issues dealt within it?' Any comments, or advice would be gratefully received: you can write or email any of the members of the working group, or executive.

REVIEW OF HIGHER EDUCATION FINANCING AND POLICY

Minister for Employment, Education, Training and Youth Affairs Senator Amanda Vanstone has released the names of the Chair and Committee members and the terms of reference of the comprehensive higher education review foreshadowed in the Budget. Senator Vanstone stated that the Review is a key part of the Government's commitment to increase standards in Australia's higher education institutions and ensure the sector is equipped to face the challenges of the future.

Mr Roderick West, the former headmaster of Sydney's Trinity Grammar School, will head the Review Committee. Mr West has a distinguished record in education and outstanding leadership skills in the field of education. He retired in 1996 after 21 years as headmaster of Trinity after presiding over the most impressive period of growth that the school has experienced. His leadership qualities are well recognised and have contributed to the school's international recognition and its current position of eminence.

The other Review Committee members will be:

- Mr Gary Banks of the Productivity Commission;
- Professor Peter Baume AO, Professor of Community Medicine at the University of New South Wales and Chancellor of the Australian National University;
- Professor Lachlan Chipman, Vice-Chancellor of the University of Central Queensland;
- Dr Doreen Clark, Managing Director of Analchem Bioassay Pty Ltd;
- Mr Clem Doherty, a private consultant and former Director of McKinsey & Company; and
- Professor Kwong Lee Dow AM, Dean of the Faculty of Education at the University of Melbourne;

The Committee's Terms of Reference will require it to undertake a wide ranging review of Australia's higher education sector, its effectiveness in meeting national needs, and the developments that will shape the provision of higher education. The Committee will also identify options for the financing of higher education teaching and research, including contributions from the Commonwealth.

The Government has asked the Committee to report by the end of this year.

TERMS OF REFERENCE

BACKGROUND

The last decade has been a period of sustained and far-reaching change for Australia's higher education sector. Increases in access and participation have completed its transformation from an elite to a mass higher education system. At the same time, there has been pressure both to restrain expenditure and to address the issues arising from the rapid expansion of the system, such as the need for quality assurance processes. Associated with this transformation have been other changes, including the removal of the binary divide in higher education, increased use of targeted research funding, and the increased use of advanced communications technology by institutions.

The next two decades are likely to bring additional change to the sector. Higher education will increasingly become an international enterprise, where services are delivered to a global market place and international links are vital to the creation and advancement of knowledge. Developments in communications technology will reinforce these trends. These developments also will continue to change the delivery of higher education and the management of information, with profound effects on the nature of teaching and learning and the provision of teaching and research infrastructure.

At the same time, higher education will become an increasingly vital component of the economic and social fabric of advanced industrial societies. A diverse, high quality higher education sector will be one of Australia's most important comparative competitive advantages as manufacturing processes and capital become more mobile.

It is timely, therefore, to examine the fundamental processes that are shaping the future of higher education in Australia, and to consider the policy frameworks and financing arrangements that are necessary to ensure that universities meet Australia's economic and social needs in the long term, and are able to respond to the challenges and opportunities posed by their increasingly competitive environment.

TERMS OF REFERENCE

1. The committee will undertake a broad ranging review of the state of Australia's higher education sector, the effectiveness of the sector in meeting Australia's social, economic, scientific and cultural needs, and the developments which are likely to shape the provision of higher education in the next two decades.

2. The review committee will develop a comprehensive policy framework for higher education that will allow universities to respond creatively and flexibly to change, and will ensure that the sector meets the needs of students, industry and society in general as these are likely to develop over the next two decades.

3. Within this framework, the review committee will identify options for the financing of higher education teaching and research, and for providing Commonwealth funding to higher education institutions for these purposes.

SCOPE OF THE REVIEW

The Government does not wish to limit the scope of the review committee's work in any way, though it expects that the review committee will examine long term developments in the following areas, and the implications of these developments for higher education teaching and research:

- the internationalisation of higher education;
- sources of finance for higher education;
- historical trends and likely future directions in the level and nature of demand for higher education;
- the equality of opportunity to participate in higher education;
- the level and nature of industry demand for higher education graduates and higher education research, and the contribution that graduates and research conducted within higher education institutions makes to the competitiveness of Australian industry;
- the role of research conducted in higher education institutions in the national research and innovation system, and the increasing importance of international links for research conducted in higher education institutions in Australia;
- teaching practice and course content in the context of changing undergraduate and postgraduate students' needs and developments in the knowledge base of disciplines;
- the use of advanced communications technologies in teaching, and in libraries and other teaching and research infrastructure;
- pressures on higher education quality assurance and accreditation processes arising from the development of a more diverse higher education sector;
- policy and practice in public sector financing and management, including the increased emphasis on competition, contestability and competitive neutrality principles; and
- the review committee will take account of the requirements of the Commonwealth's legislation review program.

THE REVIEW COMMITTEE'S REPORT

In developing its recommendations, the Government expects that the review committee will pay particular attention to the need to ensure that:

- public funds for higher education teaching and research are used efficiently and effectively, and appropriate accountability arrangements are in place;
- Government funding mechanisms and processes encourage diversity between higher education institutions and excellence in teaching and research;
- program and advisory structures for research and development in the higher education sector
  - ⇒maximise the development of high level skills,
  - ⇒maximise the contribution of higher education research to the broader research and innovation system,
  - ⇒strengthen Australia's research base and its contribution to Australia's long term sustainable industry competitiveness, and facilitate the communication of research results to end users in industry and the community
- Government funding mechanisms support a national system of higher education, in which it is recognised that universities play a vital role in regional economies;
- there is an appropriate balance between private and public funding for higher education;
- financial, social and geographic factors do not act as a barrier to higher education for appropriately qualified students within Australia;
- higher education institutions are committed to achieving high quality outcomes and to continuous quality improvement;
- the structure and range of higher education courses meet the needs of students and industry;
- the interfaces between the higher education sector and the vocational education and schools sectors operate efficiently and effectively; and

- commercial activities comply with the principles of competitive neutrality.

AUSTRALIA HAS TOO MANY UNIVERSITIES

The following article by Joe Baker (FASTS President) appeared in the Sydney Morning Wed, 22 Jan 1997 Herald on the Opinion page, page 15.

It would be good to continue the discussion in the letters column of the SMH to give further exposure to the challenging situation that S&T disciplines face in our universities.

The SMH prefers letters of less than 200 words. They can be emailed to:
Email: letters@smh.com.au
Fax: 02 9282 3492

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Web address: http://bimbo.pharmacol.su.oz.au/fasts/fastshome.html

"Australia has too many universities to be able to offer high-quality science courses in all disciplines at all institutions. This is a straightforward statement, but when FASTS - the Federation of Australian Scientific and Technological Societies - issued a list of priority areas to be addressed over 1997, this sentence caused great consternation.

People variously misinterpreted it as a call for less science, with an implied threat to jobs. It is neither of these, and nor is it a challenge to any isolated or individual University.

But it does call attention to a national issue: the need for well-funded science departments with the infrastructure and equipment to offer proper facilities for teaching, research training and research.

Universities are currently going through a slimming process, one which has an air of panic about it. A market-driven slimming process does not sit well with science - science departments at some Universities make easy targets because numbers are falling and they are expensive to run. Science is a long-term activity: the benefits can be slow to realise, and the personnel are not easy to replace.

Scientists working in the Universities are walking a funding and budgetary tightrope. All they can see ahead are red lights and danger signs, as the Universities face up to a series of challenges. These include providing quality teaching for

students, and adequate careers for staff in a time of declining budgets; coping with a shrinking demand for S&T courses (particularly from quality students with high tertiary entrance scores) and the uncertain effects of differential HECS; finding the funds for sophisticated equipment; and meeting the challenges of international competitiveness and industry and commerce.

The short-term financial constraints which have operated in the last year and the way they are impacting on the science and technology-related disciplines may cost the country dearly in the future.

The cost can be counted in student enrolment patterns in science and engineering for 1997. Victorian universities are reported to have reduced their cut-off scores for entry to S&T courses by as much as 15 points, and the NSW figures due later this week will be closely watched for similar moves.

One possible way to guarantee access to high quality science education and research is by amalgamation of departments and shared teaching. This would create a limited number of well-funded discipline areas in each university. It is just one potential solution: imaginative (because the challenges are not only of the budgetary kind) and worth examination, but not a complete answer. A recent study by the Royal Australian Chemical Institute recommended the forming of larger University departments. It said that the minimum size for a stand-alone research-related chemistry department should be 10 teaching-and-research staff, and 20 honours and research higher degree students.

The makeup of the Higher Education Review Committee announced by Education Minister Amanda Vanstone last week offers some promise of a solution to the budgetary problem. The Panel includes such experienced scientists as Doreen Clarke (an organic chemist with a strong interest in environmentally friendly agricultural chemicals and the first woman ever to be President of the Royal Australian Chemical Institute); and Peter Baume (a gastroenterologist and physician, and currently Professor of Community Medicine at UNSW).

The Review Committee will be aided by the breadth of view taken in the paperwork which accompanied the Minister's announcement. It will not be constrained from seeking imaginative solutions, although the "two decades" specified in the terms of reference is considered short in scientific terms.

The terms of reference should have recognised the key role universities have in basic or fundamental research. They should also have referred to Australia's needs in ecologically sustainable development, and in meeting international responsibilities in areas such as Biological Diversity and establishing a proper understanding of Australia's Ocean Territory.

Most importantly, the Review must not overlook the value of the individual scientist. The focus must remain on academic scientists working at the coalface, because they alone know how to arrange their resources in the science and technology-based discipline areas. They should be the ones to identify and analyse alternative approaches to maintain student access, and standards of teaching and research in S&T.

They are closest to the problem, they are best able to understand the resources available, and have the best appreciation of the non-financial impacts of any recommended course of action.

Joe Baker

Joe Baker is President of the Federation of Australian Scientific and Technological Societies which represents 40,000 working scientists and technologists nationwide.

ANNOUNCEMENTS

World Wetlands Day

This will be celebrated on 2 February and has been endorsed by the Ramsar Convention. The Convention was in fact formulated on 2 February 1971 in the Iranian city of Ramsar. Member countries of Ramsar have been encouraged to undertake wetland activities on this day after a successful trial day in 1996.

Additionally, members of the Australian Wetlands Alliance will use World Wetlands Day to raise the profile of wetlands conservation and the role of NGOs.

Max Finlayson
Email maxf@eriss.erin.gov.au

WANTED

Mud from temporary pools anywhere in Australia
in which eggs (cysts) of *Triops australiensis*
and species of Anostraca are included.

Please send to:

Dr Ernst-Gerhard Burmeister
Section - Aquatic Insects
Zoologische Staatssammlung München
Münchausenstrasse 21,
D-81247 München
Germany

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Are you coming to ESA97?

The 1997 Ecological Society of Australia Conference and Open Forum (ESA97) will be held immediately following the ASL Annual Conference, at the same venue, during Tuesday 30 September - Friday 3 October 1997.

Why not attend both?

Details and registration forms are available from:

Dr Nicholas Klomp (nklomp@csu.edu.au)
Johnstone Centre
School of Environmental & Information Sciences
Charles Sturt University
PO Box 789
Albury, NSW. 2640. Australia.
Tel: +61 (0)60 51-9905
Fax: +61 (0)60 51-9897

Or try the ESA97 home page: http://life.csu.edu.au/esa/esa97.html

MEDIA SKILLS COURSES

This practical two-day workshop teaches scientists to:

- control their message to the media with confidence
- practice their interview techniques with 5 working journalists
- get their message out accurately

The aim of the media skills course is to help scientists control their media appearances.

Dates for 1997: Adelaide - March 13-14
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Sydney - June 19-20
Brisbane - July 17-18
Melbourne - August 14-15

PRESENTATION SKILLS COURSES

This practical two-day workshop teaches scientists to:

- give presentations with confidence
- structure talks in a logical way
- deliver interesting and animated presentations
- handle the unexpected question
- use visual aids to add impact

The aims of the Presentation Skills Course is to help participants to communicate their message effectively to a range of audiences.

Dates for 1997: Adelaide - March 10-11
Canberra - April 17-18
Sydney - June 16-17
Brisbane - July 14-15
Melbourne - August 11-12

Courses can be run in other locations, and special workshops can also be conducted - intensive workshops for smaller groups, one day workshops, or combined Media and Presentation Skills workshops. Discuss your needs with the presenters.

For further information contact:

Jenni Metcalfe
Senior Consultant, Econnect - environmental and science communication
PO Box 464
Paddington QLD 4064
Phone (07) 3367 2646; Fax (07) 3217 6376; Mobile 014 91 6372

NEW BOOKS

Buffer Zones: Their Processes and Potential in Water Protection. Proceedings of the International Conference on Buffer Zones, September 1996
Eds Haycock N.E., Burt T.P., Goulding K.W.T. and Pinay G.

Distributor: Foundation for Water Research, Allen House, The Listons, Liston Road, Marlow, Bucks. SL7 1FD UK.
Tel: +44 (0) 1628 891589 Fax: +44 (0) 1628 472711
Published February 1997, approximately 330 pages
Publisher : Quest Environmental, PO Box 45, Harpenden, Herts. AL5 5JL, UK

A unique collection of papers, written by international experts, that reviews the current knowledge on the processes occurring within buffer zones as well as exploring the potential of a range of habitats to act as buffer zones. This book will be highly relevant to both researchers as well as those involved in catchment land management issues where water protection is the focus. The proceedings consist of three parts; part I, the processing of target chemical within buffer zones; part II, the potential of habitat types to act as buffer zones; part III, the creation, restoration and long term sustainability of buffer zones.

Contents of Proceedings

Introduction, N.E. Haycock, T.P. Burt, K.W.T. Goulding and G. Pinay

Buffer Zones and Water Quality Protection: General Principles, D.L. Correll

The Hydrological Role of Floodplains within the Drainage Basin System, T.P. Burt

Buffer Zones as Sediment Traps or Sources, T.A. Dillaha III and S.P. Inamdar

The Interactions of Buffer Zones and Phosphorus Runoff, J. Uusi-Kämppä, E. Turtulo, H. Hartikainen and T Yläranta

Nitrogen Dynamics and Buffer Zones, J.W. Gilliam, J.E. Parsons and R.L. Mikkelsen

Pesticide Contamination of Surface Waters - The Potential Role of Buffer Zones, G.L. Harris and A. Forster

Grassed Buffer Zones to Limit Contamination of Surface Waters by Pesticides: Research and Action in France, J.J. Gril, B. Real, L. Patty, M. Fagot and I. Perret

The Relationship between Land Use, River Bank Biodiversity and the Lotic Macroinvertebrate Community, B. Grumiero and G. Salmoiraghi

Contaminant Effects on Microbial Functions in Riparian Buffer Zones, P.M. Groffman

The Influence of Sedimentation on Vegetation Structure, J. Girel and G. Patou

The Potential Role of In-Stream and Hyporheic Environments as Buffer Zones, A.R. Hill

The Potential Role of Riparian Forest Ecosystems as Buffer Zones, R. Lowrance, L.S. Altier, J. Denis Newbold, R.R. Schnabel, P.M. Groffman, J.M

Further Information on Ordering (and a 15% Discount) can be obtained at: http://www.res.bbsrc.ac.uk/buffzone/proceed.htm

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Two New Books on the Diatomaceae of Tasmania

Many of the listed and illustrated taxa are found throughout Australia.:

Dominic Hodgson, Wim Vyverman and Peter Tyler. *Diatoms of meromictic lakes adjacent to the Gordon River, and of the Gordon River estuary in south-west Tasmania.* Bibliotheca Diatomologica, Band 35. J. Cramer, Berlin, Stuttgart. 174pp.

Wim Vyverman, Ruth Vyverman, Dominic Hodgson and Peter Tyler. *Diatoms from Tasmanian mountain lakes: a reference data-set (TASDIAT) for environmental reconstruction and a systematic autecological study.* Bibliotheca Diatomologica, Band 33. J. Cramer, Berlin, Stuttgart. 192pp.

Information from:

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British Antarctic Survey
High Cross
Madingley Road
Cambridge
United Kingdom
CB3 0ET
Email: DAHO@pcmail.nerc-bas.ac.uk

DAMS AND RIVERS: SCIENTISTS TAKE A NEW LOOK DOWNSTREAM

Dams provide many benefits -- reducing flood hazards, providing reliable water supplies, producing hydroelectric power, and providing places for flatwater boating -- but with those benefits come environmental consequences -- eroding river banks, changes in waterfowl habitat, concerns for safe recreational use, and the loss of river sand bars, according to a new report by the U.S. Geological Survey.

"Dams and Rivers: Primer on the Downstream Effects of Dams," the new USGS report, outlines the role of science in restoring or otherwise altering these downstream effects.

"The USGS has spent more than 100 years monitoring the nation's rivers and streams and providing the hydrologic data needed to design the nation's infrastructure of dams,"said Robert M. Hirsch, USGS chief hydrologist, Reston, Va. "Today, the era of dam building in the United States is largely over and the USGS has turned some of its monitoring and research focus towards providing dam managers and resource planners with the kind of in-depth information they need to reduce some of the more harmful downstream effects of dams on river environments."

The USGS report looks at dams and rivers in seven selected areas of the country -- the Upper Salt River in central Arizona; the Snake River in Idaho, Oregon and Washington; the Rio Grande in New Mexico and Texas; the Chattahoochee River in Georgia; the Platte River in Wyoming, Colorado and Nebraska; the Green River in Utah; and the Colorado River in Arizona - to focus on specific downstream effects of dams and the management issues related to their operation.

The 94-page, richly illustrated USGS report has a special section on the role of science in the management of dams to minimize downstream impacts. For example, research provides hard data on environmental changes that might occur if water releases are altered. By using computer modeling, management plans can be developed that best balance needs of users with concerns for the environment. Monitoring and long-term data sets of streamflow trends can help in the development of better predictions of the movement of water and sediment below dams.

"The downstream effects of dams are a subject of much public controversy and debate," said Robert Hirsch, USGS chief hydrologist. "In asking our scientists to produce this report, we wanted to emphasize the important role that science has in helping society to make informed decisions about the management of the nation's dams and river systems.

"Scientists are increasingly being called upon to suggest dam operation regimes that will minimize a particular negative impact to the downstream environment," Hirsch said. "Scientific insights gained from hydrology, however, must be integrated with recommendations from the fields of biology, economics and engineering. We must look more and more to interdisciplinary scientific approaches to help those who manage the nation's water and other natural resources.

"Any scientific recommendation that alters a dam's operation must be evaluated in the context of the people whose lives will be most directly affected -- people whose interests may be as disparate as the river runner who wants steady in-stream flow and the farmer who wants to irrigate crops with low-salinity water," Hirsch said. "To better balance those issues in the management debate, we must be able to provide the critical science foundation upon which sound and effective decisions can be made."

Highlights from the featured rivers and the issues they represent:

The ***Upper Salt River***, a natural stream in central Arizona, has all of the characteristics of a healthy, unregulated river. Flow and sediment transport vary widely from one season to another and from year to year. Occasional high-magnitude floods move cobbles and boulders into bars, which form rapids that attract recreationists. Native riparian (along the river bank) vegetation forms a dense band above flood level and non-native vegetation is sparse. The river is always in the process of adjusting its channel to the equilibrium that exists between erosion and sediment deposition. The Salt River offers a standard against which to compare regulated rivers.

The ***Snake River in Oregon***, Idaho and Washington is one of the most extensively dammed rivers in the West. The Hells Canyon Complex of dams on the Snake River in Oregon, Idaho and Washington have severely altered the normal dynamics of the river's flow. The dams have limited reservoir storage and limited value for flood control and are used to provide hydroelectric power at times of peak demand through a grid system that provides electricity throughout the West. Dams on the Snake block historical salmon spawning runs. Frequent high-flow releases have caused depletion of sand in the river channel downstream from the dams.

The ***Rio Grande*** is, in a sense, one river cut and transformed into two -- a vigorous and unregulated snow-fed river in northern New Mexico and a highly regulated river with substantial flow where it reaches the Gulf of Mexico. The dam was designed to retain all flow on the Rio Grande, releasing water only for irrigation purposes. As a result of this restricted flow, sediment loads, which normally are resuspended and transported downstream during high flows, have accumulated on the river bed and the channel has been invaded by tamarisk (a non-native, salt-tolerant bushy tree) for hundreds of miles below the dam. The channel has

diminished in size since the dam was constructed and can no longer contain floods as large as it once could. As a consequence, relatively minor floods have caused significant \damage to riverfront properties and structures downstream from the dam.

The ***Chattahoochee River in Georgia*** is managed with recreation as a high priority, including boating and prize trout fishing. Lake Lanier above Buford Dam is the most heavily visited, federally managed lake in the country. Buford Dam is also used to meet peak-power demands of the Southeast hydroelectric power grid. The consequences of these patterns of frequent water release affect the safety of recreational users and have resulted in erosion of the river banks downstream.

The channel of the ***Platte River*** in Wyoming, Colorado and Nebraska has been narrowed to as little as 15 percent of its former width as a result of in-channel sediment accumulation in some stretches, caused by the placement of dams upstream. The numerous dams and reservoirs that provide flow regulation for irrigation have also depleted much of the Platte River's volume and significantly reduced the magnitude of spring floods. The riparian habitat, depended on by various species of cranes and other waterfowl, has also been severely restricted. Balancing the need for irrigation water for farmers upstream and for restoring wildfowl habitat downstream is one of the management challenges being faced. Adaptive management techniques have been suggested that would allow for moderate releases that could submerge sandbars that would otherwise host germination of unwanted vegetation. Under such a management strategy, planned releases could also open and maintain a channel adequate for use by waterfowl.

The ***Green River*** in Utah, Wyoming and Colorado has had its channel profoundly altered and its water temperature affected by the construction and operation of Flaming Gorge Dam. Native fish were sufficiently threatened by these changes that the U.S. Fish and Wildlife Service invoked the Endangered Species Act to mandate dam releases deemed least likely to harm native fish. Dam operations have been modified in ways thought to be beneficial to the habitat of native fish. Collaborative work on the operation of Flaming Gorge Dam sets a precedent for a cooperative approach to minimizing the problems that exist below dams.

The ***Colorado River*** is the very heart of the Grand Canyon in Arizona. Glen Canyon Dam, which impounds Lake Powell, traps the vast quantity of sediment that once flowed through Grand Canyon. The clear, cold water that is discharged from the dam and the elimination of annual flooding have altered sediment transport and the biological communities along the Colorado River in Grand Canyon National Park. Glen Canyon Dam is authorized for flood control, recreation and hydroelectric power in addition to its water storage and distribution function. To balance these many mandates, studies that provide scientific input into dam operation suggest the benefit of occasional, specifically designed high-flow releases

--beach-building flows. Such a controlled flood was conducted in April 1996 downstream from the dam and was designed to resuspend and transport accumulated sediments at the bottom of the channel. In rebuilding sand bars and beaches along the river, this controlled flood experiment demonstrated that such engineered floods can have a beneficial effect and that dam management strategies can be developed to allow for such periodic events.

Written for a general audience, the USGS report also provides an extensive bibliography of available resources for a more technical investigation on the general topic and the specific river systems.

Single copies of the report, published as USGS Circular 1126, "Dams and Rivers: Primer on the Downstream Effects of Dams," by Michael Collier, Robert H. Webb and John C. Schmidt, are available free of charge from the Branch of Information Services, U.S. Geological Survey, Box 25286, Denver Federal Center, Denver, Colo. 80225.

NEWS FROM FASTS

FASTS IDENTIFIES "TEN TOP" ISSUES

Here are the "Ten Top" issues identified by FASTS' Council this year. They will help guide FASTS Board and Executive in their submissions over 1997.

According to FASTS the lists comprises the ten most pressing issues facing science and technology in Australia, and represents the views of 40,000 working scientists and technologists through their representative peak body. "One of the Government's New Year's Resolutions should be to make better use of the capacity of science and technology to generate wealth-creating industries," Dr Baker said. "New industries means more jobs, and a secure future for Australia in a hotly competitive part of the world.

The "Ten Top Issues" covers subjects ranging from

- reducing the number of universities in order to guarantee access to high-quality science education and research;
- boosting the scientific exploration of Australia's Ocean Territory in order to exploit marine and seabed resources in a sustainable manner; and
- addressing the looming shortage of properly trained mathematics and science teachers.

Top of the list is a call for the Government to develop a national vision for Australia, with a clear place for science and technology.

FASTS is organising a Forum at the National Press Club in March. The Forum, to be called "A Gross Waste of Talent?" will seek imaginative solutions to a problem which drives many of Australia's best young scientists away from a career in S&T, and is jointly sponsored with the National Tertiary Education Union.

FASTS TOP TEN POLICIES

1. **A NATIONAL VISION FOR AUSTRALIA TO 2020 AND BEYOND:** FASTS urges the Government to determine a national vision for Australia's sustainable development, and to establish what science and technology is needed to support that future. This process, working through a national summit, should set broad national priorities.

2. **THE DIFFERENTIAL HECS FEES AND SCIENCE:** FASTS recommends that the Government monitors science enrolments in universities and the impact of differential HECS fees, and takes immediate remedial action should there be any significant decline in numbers.

3. **SCIENCE AND MATHEMATICS TEACHING:** The Government must address the decline in the quality and quantity of teachers in science and mathematics, and the lack of rigour and substance in Australia's science and mathematics curricula and teaching practices. All students are taught by appropriately qualified teachers. HECS charges for teaching education should be in the lowest bracket.

4. **ENCOURAGEMENT OF PRIVATE R&D:** Funding for private R&D should be increased to internationally competitive levels. Peer-reviewed competitive grants should be used as a mechanism to distribute funds and ensure the quality of research, and the Government should address the shortage of long term venture capital by encouraging superannuation funds to invest in R&D.

5. **RESTRUCTURING THE UNIVERSITIES:** Australia has too many universities to be able to offer high-quality science courses in all disciplines at all institutions. FASTS advocates a restructuring process that guarantees access to high-quality science education and research, and which may involve amalgamation or shared teaching.

6. **PROVISION OF CAREER PATHS FOR SCIENTISTS:** Too many young scientists face uncertain careers on short term funding. More talented people, especially women, need to be attracted into scientific careers through better remuneration and more secure career paths, with real opportunities to obtain competitive research funding.

7. **INFRASTRUCTURE IN RESEARCH ORGANISATIONS:** The Government is urged to accelerate its program of replacing worn-out equipment, libraries, computer facilities and buildings in research organisations

8. **BASIC SCIENCE**: A higher proportion of Government funding for science should be directed to basic science, to underpin future developments in applied science.

9. **THE AUSTRALIAN OCEAN TERRITORY**: Australia needs to boost its scientific exploration of the AOT in order to exploit marine and seabed resources in a sustainable manner. Government should ensure adequate funding is directed the research agencies in this area, including the provision of a scientific marine fleet.

10. **PROTECTION OF INTELLECTUAL PROPERTY**: The protection of Australian intellectual property is as vital as its discovery and development. Patent costs should be an allowable R&D expenditure.

Email: fasts@anu.edu.au
Web address: http://bimbo.pharmacol.su.oz.au/fasts/fastshome.html

"The Year for Youth in Science."

On January 7, the Government declared 1997 to be "The Year for Youth in Science."

In making what is largely a symbolic declaration (there was no new money for initiatives in this area!), Minister Peter McGauran said that Australia needed more scientists, technologists and engineers, and not more doctors, lawyers and accountants.

FASTS believes the most useful step the Government could take to boost youth interest in science is to improve the quantity of properly qualified science and mathematics teachers, and to modernise science laboratories in schools.

The evidence of difficulties in teaching is mounting. Reports have pointed out the weaknesses - a huge projected shortfall of teachers, the dissatisfaction of the existing workforce, lower numbers entering the discipline areas.

The Preston Report by the College of Deans of Education confirms anecdotal reports of the situation in Australian schools and universities:

- that too many school students are being taught mathematics and science subjects by teachers not qualified to teach these subjects
- that the universities are not producing enough teachers with qualifications in areas such as mathematics, physics and chemistry
- that the pool of graduates in science and mathematics available to go on to gain teaching qualifications is growing smaller in number and weaker in quality

Australia needs to boost the supply of good science and mathematics teachers to inspire students to enter these courses at university. All sorts of career opportunities open up to people with qualifications in science and mathematics.

The corollary is that all sorts of difficulties lie ahead for the nation which fails to educate the next generation to cope with the challenges of the future.

From the FASTS January 1997 Circular

Careers Forum

FASTS and the National Tertiary Education Union are organising a one day Forum to examine the question of career opportunities for younger research scientists.

It will be at the National Press Club in Canberra on Wednesday March 19, and features a nationally-televised lunch time address by Professor Ian Lowe of Griffith University. The Minister for Science and Technology and his shadow counterparts have been invited to speak, along with young scientists and leading figures from industry, research and the universities.

The Forum goes all day, and the registration fee includes a seat at the Press Club lunch. This is an opportunity to devise constructive solutions to a problem which threatens the next generation of Australia's research scientists.

The West Review of Higher Education

FASTS' Secretary Dr Chris Easton, of the Research School of Chemistry at the ANU, is coordinating FASTS' submission to the Review. (ph 06-279 8201, email easton@rsc.anu.edu.au)

The advertisement calling for submissions will appear on Feb 19, and submissions have to be in by April 4. Review Secretary is Ian Creagh (ph. (06) 240 7344, fax (06) 240 8854, email ian.creagh@deetya.gov.au

An indication of FASTS' approach to this Review is in an article I wrote for the Sydney Morning Herald last month: "Scientists working in the Universities are walking a funding and budgetary tightrope. All they can see ahead are red lights and danger signs, as the Universities face up to a series of challenges.

"These include providing quality teaching for students, and adequate careers for staff in a time of declining budgets; coping with a shrinking demand for S&T courses (particularly from quality students with high tertiary entrance scores) and the uncertain effects of differential HECS; finding the funds for sophisticated equipment; and meeting the challenges of international competitiveness and industry and commerce."

The Factor (f) Scheme

I have asked to Prime Minister to extend the life of the Factor (f) Scheme. Under this Scheme, Government incentives for companies to undertake R&D are compensated for by lower-cost pharmaceuticals to the Australian public. It has led to strong growth, significant private investment in infrastructure and research, and the development of a world-leading pharmaceutical industry in Australia.

FASTS supports Factor (f) as an example of the way Government can encourage industry to undertake R&D, and believes that the Government could well consider how the concept could be extended to other scientific and technological areas.

As Robert Gottliebsen said in the Business Review Weekly recently: "Many countries to our north would walk over hot coals to get the technology we have developed here as a result of Factor f. I suspect many European countries would have the same view." (December 16, p. 6)

The Factor (f) scheme is a clear example of good science combined with good business. It would be to the detriment of Australia's interests if this scheme were to be curtailed or abandoned.

Meeting with Chief Scientist, Professor John Stocker

Members of the Board and Executive of FASTS had a profitable half day meeting with John Stocker and Eric James from DIST on 24 January.

Much of the discussion revolved about FASTS "Ten Top" issues for 1997, and the Review of S&T that the Chief Scientist will carry out. (Details have already been distributed to Member Societies.)

It is interesting that the Chief Scientist's terms of reference nominate FASTS (along with the academies of science) as an organisation he must consult.

Mr Toss Gascoigne
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Mobile: 0411-88 3418
Email: fasts@anu.edu.au
Web address: http://bimbo.pharmacol.su.oz.au/fasts/fastshome.html

CONFERENCE REPORTS

REPORT ON LWRRDC-SPONSORED AND ASL-HOSTED WORKSHOP ON BIOLOGICAL MANIPULATION

Paul I Boon
Email: paul.boon@vut.edu.au

Those of you who attended last year's ASL meeting in Berri will remember that the Society hosted a Workshop on Biological Manipulation after the Annual Congress. On behalf of the Society, I wrote the Final Report (ie Proceedings and Recommendations) for submission to LWRRDC. The Report was reviewed by four external "referees' before submission, to ensure that it was balanced and fair. The submission of the Final Report to LWRRDC marks the completion of the consultancy granted to the Society. We made a small profit from hosting the Workshop, which will be put to good use in sponsoring student awards etc in future years. One final point: Bill Williams has kindly offered to publish the papers arising from the Workshop in *Lakes and Reservoirs: Research and Management*. I'm the Guest Editor for this special issue of the journal; with some luck we should see the papers published within 18 months. Contact me if you'd like additional information on the Workshop, the Final Report or the special issue.

The Summary of the Proceedings is as follows:

The Land and Water Resources Research and Development Corporation (LWRRDC) commissioned the Australian Society for Limnology (ASL) to hold a national workshop to examine the possible applications of biological manipulation (concentrating on biomanipulation) approaches to control blooms of noxious phytoplankton in inland Australian waters.

The major conclusions reached were:

- overseas research had shown that biomanipulation was a valid approach for controlling blooms of noxious phytoplankton in some situations
- was no *a priori* reason why biomanipulation could not be trialed in Australia
- biomanipulation trials had to be very carefully planned if resources were not to be wasted
- the likelihood of biomanipulation resulting in the control of algal blooms was increased markedly if additional management tools (ie., nutrient reduction, flow control, macrophytes reintroductions, etc) were applied simultaneously.

CONFERENCE CAPERS

AUSTRALIA 1997

- **Ecology of Estuaries and Soft Sediment Habitats**, 4-7 February 1997, Warrnambool, Victoria. Information from Andrew Constable or Brad Mitchell, School of Aquatic Sciences and Natural Resources Management. PO Box 423, Warrnambool, Victoria, 3280. Fax: (055) 63-3462 Email: aconst@deakin.edu.au

- **Ninth Taxonomic Workshop** (Trichoptera, Ephemeroptera, Chironomidae, Plecoptera), 18-20 February 1997, Murray-Darling Freshwater Research Centre, Albury. Enquiries from John Hawking, MDFRC, PO Box 921, Albury NSW 2640. Ph: 060-582300 or Fax: 060 431626.

- **Multi-Objective Surface Drainage Design Workshop**, 11-13 March 1997, Moama Vic. Registration due by 21/2/97, registration fee $100. Further information from Maureen Murphy, Secretary, MDBC Drainage Workshop, Sinclair Knight Merz, PO Box 2500, Malvern Vic 3144. Ph: 03 9248 3309; Fax: 03 9248 3364

- **Aquatic Ecology Postgraduate Workshop**, 17-19 March 1997, Queenscliff Victoria. Details from AEPGWS@lake.canberra.edu.au *(or see Announcements Section in ASL Vol 33(3)).*

- **Sampling Nutrients in Aquatic Ecosystems Workshop**, 21 and 22 April 1997, University of Canberra. *(see "News from the CRC's" Section ASL Vol 33(3))*

- **Australian Network for Plant Conservation**, Third National Conference, 23-27 June 1997, Coffs Harbour, NSW. Further information from Jeanette Mill, Ph: 06-250 9509; Fax: 06-250 9599 Email: jmill@anbg.gov.au

- **10th International Congress of Protozoology** (ICOP-X), 21-25 July 1997, The University of Sydney, Australia. Registration documents and abstract forms are available from: ICOP-X Congress Manager, Business Meetings & Incentives, PO Box 561 Crows Nest NSW 2065 Australia

- **Landcare: Changing Australia**, 16-19 September 1997, Adelaide Convention Centre, Adelaide, SA. Further information from: Andrew Curtis Ph: 08-8303 9339; Fax: 08-8303 9320 Email: landcare@pi.sa.gov.au

- **Australian Society for Limnology**, 26-29 September 1997, Albury, NSW. Registration details in the March 1997 Newsletter (ASL Vol 34(1)). Information from Alan Chick, Fax: 060-431 626, Email: chicko@mdfrc.canberra.edu.au

- **Ecology Society of Australia**, 1-3 October 1997, Albury, NSW. Information from Dr Nicholas Klomp. Fax: (060) 51-9897 Email: nklomp@csu.edu.au

- **2nd International Symposium on Ecology and Engineering (ISEE)** "Enginering the Aquatic Environment" 10-12 November 1997. Venue: Fremantle, Western Australia. Jointly organised by the Centre for Water Research at The University of WA and the Coastal and Offshore Engineering Institute, Universiti Teknologi Malaysia. The focus will be on methods for the preservation, maintenance and rehabilitation of aquatic systems in the broadest sense. The organisers hope to bring together geomorphologists, chemists, biologists and engineers to find solutions through field investigations, laboratory experimentation and numerical modelling. The focus will be on process rather than socio-economic managment. Inquiries: Professor Jorg Imberger and Vicki Sly. Tel: 09-380-3911, Fax: 09-380-7115 Email: sly@cwr.uwa.edu.au; http://www.cwr.uwa.edu.au/javindex.html

- **The Other 99%, the Third Conservation and Biodiversity of Invertebrates Symposium,** 9-12 December 1997, Sydney, NSW. Further information from Coordinator, Invertebrate Biodiversity Conference, Australian Museum Ph: 02-9320 6224; Fax: 02 9320 6050

OVERSEAS 1997

- **Aquatic Life-Cycle Strategies: Survival in a variable environment**, 14-17 April 1997, The University of Portsmouth, UK. Further Information from: Prof. Michael Whitfield, Marine Biological Association of the United Kingdom. Fax: +44 (0) 1752 633 331; Email: sec@mba.ac.uk or mikewmba@dial.pipex.com.

- **Groundwater Dominated Rivers**: 2 -Day Workshop, 17-18 April 1997, Southhampton University UK. Further Information from Dr David Sear, Dept. of Geography, University of Southhampton, UK. Fax: +44 (0) 1703 592795; Email D.Sear@soton.ac.uk. OR Dr Patrick Armitage, Institute of Freshwater Ecology, Fax: +44 (0) 1929 462314; Email: PDAR@wpo.nerc.ac.uk.

- **Second International Isopod Conference and Workshop**, 18-21 May 1997, Dauphin Island Sea Lab, Dauphin Island, Alabama. The Conference immediately precedes the Summer Meeting of the Crustacean Society in Mobile, Alabama. Further information from Brian Kensley, NHB-163, Smithsonian Institute, Washington, D.C. 20560. Phone: (202) 357-4666, Fax: (202) 357-3043, Email: MNHIV019@SIVM.SI.EDU

- **North American Benthological Society**, 45th Annual Meeting, 26-30 May 1997, Southwest Texas State University, San Marco, Texas. Abstracts due by 16th December 1996. Send to: Dr Thomas L Arsuffi, Program Chair, Department of Biology - Aquatic Station, Southwest Texas State University, San Marcos, Texas 78666. Ph: (512) 245-2284 Fax: (512) 245-7919. Visit the NABS Home Page on: http://www.inhs.uiuc.edu/nabs/nabs.htm

- **VII International Rotifer Symposium**, 22-27 June 1997, Collegeville, MN, USA. Theme for the symposium is "Rotifer Biology: a comparative approach". Contact: Dr Elizabeth Wurdak, St Johns University, Collegeville, MN 56321, USA.

- **The VIII International Conference on Harmful Algae**, 25-29 June 1997, Vigo, Spain. The topics of the conference will be: I. Ecology Oceanography Harmful Algae Events; II. Taxonomy; III. Toxins; IV. Management of Toxic and Harmful Algae Events; V. Pharmacological and Epidemiological Studies. The conference will comprise: i) Keynote lectures b) Oral and poster presentations; c) Round table discussions. Professor Ramćn Margalef, from University of Barcelona (Spain) will give the opening address. The scientific sessions will be held in the Cultural Centre "Caixavigo" in Vigo. Vigo is the most populous city of Galicia (NW Spain), base of the biggest fishing fleet in Europe and a major center for aquaculture and the seafood processing industry. The official language is English, which will be used for all presentations and documentation (except the second announcement, that will be in English and Spanish). DEADLINES: Submission of abstracts: December 15, 1996; Registration: 1 March 1997; Submission of manuscripts for review: April 20, 1997; Submission of manuscripts in publication format: 31 July 1997
  Further Information and Registration forms from:
  Beatriz Reguera, Conference Coordinator, Instituto Espanol de Oceanografia, Aptdo. 1552. 36280 Vigo. SPAIN.
  Fax +34 86 492351; e-mail: insovigo@cesga.es

- **Seventh International Symposium on Regulated Streams**, 25-29 August 1997, Tennessee Valley. The theme of this SISORS III is "mamaging regulated rivers for biodiversity". Primary sessions will focus on three main topics: (1) Rehabilitation of large rivers; (2) Terrestrial and aquatic interactions; and (3) Restoration of tailwater habitats. Contributed papers on any aspect of regulated flow eceology and management are also welcome for oral or poster presentation. Abstracts (<500 words) should be submitted by 20 December 1996. Selected papers will be published in Regulated Rivers. The conference will be held at the Chattanooga Choo-Choo Holiday Inn, Chattanooga, Tennessee, USA. Further information from Dr James B. Layzer, Tennessee Cooperative Fishery Research Unit, Tennessee Technological University, Cookeville, TN 38505, USA. Ph: 1-615-372-3094 Fax: 1-615-372-6257.

- **Seventh International Symposium on Aquatic Oligochaetes**, 18-22 August 1997, University of Maine at Presque Isle, Maine, USA. Registration forms from the organiser: Dr S.R. Gelder, University of Maine at Presque Isle, 181 Main Street, Presque Isle ME 04769-2888 USA. Fax: +207-768-9608 Email: GELDER@polaris.umpi.maine.edu

- **The Great Basin Symposium on Glacial and Postglacial Drainage** - *Fifty Years of Geologic, Biologic and Hydroclimatic Progress in Late Cenozoic Aquatic System History*, 17-20 September 1997, University Park Hotel, Salt Lake City, Utah. Further Information: Linda K Williams/ GBASH, 2174 Annex, Conferences, University of Utah, Salt Lake City, Utah 84112 USA. Email: lwilliams@admin.dce.utah.edu

OVERSEAS 1998

- **XXVII International Association of Theoretical and Applied Limnology (SIL),** 9-15 August 1998, Dublin, Ireland. Theme for the congress is "water of life". Further information from: Declan Murray, Secretary General, XXVII SIL Congress, UCD Environmental Institute, Richview, Clonskeagh, DUBLIN 14, IRELAND. Information can also be found at the web site: http://nis.rtc-tallaght.ie/conferences/sil98/sil98.htm

ASL VOLUNTEERS

The following people have volunteered to speak as experts on behalf of the ASL. If you wish to be included on the list contact:

Dr Richard Marchant (ASL Secretary)
Email: rmarch@pioneer.mov.vic.gov.au

The following members are prepared to speak on behalf of the ASL on their area of expertise.

Name	Area of Expertise	Contact Details
Prof A. Arthington	in stream flows, ecology of exotic fishes, conservation of rare fishes.	Centre for Catchment & Instream Res, Griffith University, Natham Qld. 4111. Phone (07)275 7403 , Fax: (07)277 3759
Dr P. Boon	bacteriological issues, wetlands.	Environmental Management, Victoria University of Tech., PO Box 14428 MMC, Vic. 3000. Phone (03)9365 2214, Fax (03) 9365 2465. email:boopa@stamail1.vut.edu.au
Dr A. Boulton	intermittent streams, hyporheic zones, Flinders Ranges	Ecosystem Management, University of New England, Armidale, NSW 2351. Phone (067)733760, Fax (067)732 769 email: aboulton@metz.une.edu.au
Dr M. Brock	temporary wetlands, aquatic plants	Botany Department, University of New England, Armidale NSW 2351. Phone (067)732 578, Fax (067)733 283 email: mbrock@metz.une.edu.au
Dr S. Bunn	stream ecology, ecology of riparian zones, biomonitoring	Faculty of Environmental Sciences, Griffith University, Nathan, Qld 4111. Phone (07)8757 407, Fax (07)875 7459, email: s.bunn@ens.gu.edu.au
Dr G. Closs	ecology and conservation of freshwater fish, upper Murray River	Environmental Management & Ecology, LaTrobe University, PO Box 963, Wodonga, Vic. 3689 Phone (060)583873 ,Fax:(060)583888 email:gcloss@awc-net.latrobe.edu.au
Dr T. Entwisle	taxonomy and ecology of freshwater macroalgae	National Herbarium of Victoria, Birdwood Ave, South Yarra, Vic. 3141. Phone (03)96552313, Fax (03)9655 2350 email: Entwisle@botany.unimelb.edu.au
Dr M. Finlayson	wetlands, Ramsar convention	Alligator Rivers Region, Office of Supervising Sci, Post Office, Jabiru, NT 0886 Phone (089)799 756, Fax(089)792 499 email:masf@eriss.erin.gov.au
Dr T. Grant	platypus biology	Biological Science, University of NSW, PO Box 502, Cronulla, NSW 2230
K. Hortle	impact of mining, impact of development in Se Asia and PNG on rivers	Environmental Management, 18 Sharrow Road, Mitcham, Vic. 3132 Phone and Fax: (03) 9872 4101

Dr P. Horwitz	conservation of freshwater invertebrates	Dept of Science, Edith Cowan University, Joondalup Drive, Joondalup, WA 6027. Phone (09)4055717, Fax: (09)300 1257 email: phorwitz@cowan.edu.au
Dr P. Humphries	fish ecology, in-stream flows	CRC Freshwater Ecology, MDFRC, PO Box 921, NSW 2640. Phone (060)43 1002, Fax:(060)43 1626 email: hump@watson.canberra.edu.au
Dr G. Jones	cyanobacterial blooms	CSIRO, PMB 3, Griffith NSW 2680. Phone (069)601563, Fax: (069)601600 email:gary@griffith.dwr.csiro.au
Dr P.S. Lake	stream ecology, conservation freshwater biota	Ecology & Evolutionary Biology, Monash University, Wellington Road, Clayton, Vic. 3168. Phone (03)9055 653, Fax:(03)9055613 email: p.s.lake@sci.monash.edu.au
Prof J. Laybourn-Parry	plankton microbial ecology, carbon cycling in lakes, Antarctic freshwater systems	Zoology Dept, LaTrobe University, Bundoora, Vic. 3083. Phone (03) 479 2278
Dr V. Matveev	plankton food webs, biomanipulation	MDFRC, PO Box 521, Albury, NSW 2640. Phone: (060) 431002, Fax: (060) 431626.
Dr R. Pearson	tropical freshwater ecology	Zoology Dept. ACTFR, James Cook, University, Townsville, Qld. 4811. Phone:(077)814 262, Fax: (077)79 6371
J. Puckridge	ecology of arid zone rivers, ecology of freshwater fish	Zoology Department, University of Adelaide, Adelaide, SA 5005. Phone (08) 3034455. Fax: (08) 303 4364
Dr N. Rea	wetland plant ecology, water regime, weeds and conservation	CSIRO Entomology, TERC, PMB44, Winellie, Darwin NT 0821 Phone (089) 221717, Fax: (089)221714, email: naomi@terc.csiro.au
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BIBLIOGRAPHY

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1984

KOEHN, J.D. 1984. Survey of angling and recreational use of the Gellibrand River, south-western Victoria. *Arthur Rylah Institute for Environmental Research Technical Report Series* No. 10. 47 pp. (Department of Conservation, Forests and Lands: Melbourne).

1985

KOEHN, J.D. 1985. Environmental problems and approaches to determining habitat requirements for freshwater fish in Victoria. *In*: *Proceedings of the River Management Association, May 17, 1985.* (Rural Water Commission, Armadale) pp. 54-74.

1986

KOEHN, J.D. 1986. Approaches to determining flow and habitat requirements for native freshwater fish in Victoria. In: Campbell, I. C. (ed.) *Stream Protection : the Management of Rivers for Instream Uses.* (Water Studies Centre, Chisholm Institute Technology: Melbourne). pp. 95-115.

1987

KOEHN, J.D. 1987. Artificial habitat increases abundance of two-spined blackfish Gadopsis *bispinosis* in Ovens River, Victoria. Arthur Rylah Institute for Environmental Research Technical Report Series No. 56. Department of Conservation, Forests and Lands, Victoria. 20pp.

1990

KOEHN, J.D. 1990. Distribution and conservation status of the two-spined blackfish *Gadopsis bispinosus*, in Victoria. *Proceedings of the Royal Society of Victoria*. **102**: 97-103.

KOEHN, J.D.& W.G. O'CONNOR, 1990. Threats to Victorian native freshwater fish. *Victorian Naturalist* **107**:5-12.

KOEHN, J.D. & W.G. O'CONNOR, 1990. *Biological Information for Management of Native Freshwater Fish in Victoria.* (Government Printer: Melbourne) 65 pp.

KOEHN, J.D. & W.G. O'CONNOR, 1990. Distribution of freshwater fish in the Otway region, south-western Victoria, *Proceedings of the Royal Society of Victoria*. **102** :29-39.

1991

KOEHN, J.D. & A.K. MORISON, 1991. A review of the conservation status of native freshwater fish in Victoria. *Victorian Naturalist* **107**: 13-25.

KOEHN, J. D. & T.A. RAADIK, 1991. The Tasmanian mudfish *Galaxias cleaveri* Scott, 1934, in Victoria. *Proceedings of the Royal Society of Victoria* **103**: 77-86.

KOEHN, J.D., J.A. MCKENZIE, J.P O'CONNOR, W.G. O'CONNOR, D.J. O'MAHONY, T.A. RAADIK, S.R. SADDLIER & B.R. TUNBRIDGE, 1991. Miscellaneous surveys of freshwater fish in Victoria: 1982-1990. *Arthur Rylah Institute for Environmental Research Technical Report Series* No. 110. 48pp. (Department of Conservation, Forests and Lands: Melbourne).

O'CONNOR, W.G. & J.D. KOEHN, 1991. Spawning of the mountain galaxias *Galaxias olidus* Gunther, in Bruce's Creek, Victoria. *Proceedings of the Royal Society of Victoria* 103: 113-123.

1992

KOEHN, J. 1992. Habitat: the essential component of fisheries management. in: Cadwallader, P. L. (ed.). Freshwater fisheries in Victoria - today and tomorrow. proceedings of a symposium held at the Radisson president Hotel, Queens Rd., Melbourne, 11 October 1992. pp. 5-20.

KOEHN, J., T. DOEG & T. RAADIK, 1992. Aquatic Fauna. in: Squire, R. O. (ed.) *First Interim Report for the Value Adding Utilisation System Trial.* Department of Conservation and Environment Chapt. 10, pp. 60-71.

1993

JACKSON, P.D., J.D. KOEHN, & R. WAGER, 1993. Appendix 1: Australia's threatened fishes 1992 listing - Australian Society for Fish Biology. *In*: Hancock, D. A. (ed.) Sustainable Fisheries through Sustaining Fish Habitats. Australian Society for Fish Biology Workshop. Victor Harbour, SA, 12-13 August. Bureau of Resource Sciences proceedings. AGPS. Canberra.

KOEHN, J.D. 1993. Fish need trees. *Victorian Naturalist* **110**: 255-257.

KOEHN, J.D. 1993. Freshwater fish habitats: Key factors and methods to determine them. Pp77-83 *In*: Hancock, D. A. (ed.) Sustainable Fisheries through Sustaining Fish Habitats. Australian Society for Fish Biology Workshop. Victor Harbour, SA, 12-13 August. Bureau of Resource Sciences proceedings. AGPS. Canberra.

KOEHN, J. & J. BURCHMORE, J. 1993. Freshwater Habitats pp. 39-42. *In*: P.J. Kailola, M.J. Williams, P.C. Stewart, R.E. Reichelt, A. McNee & C. Grieve *Australian Fisheries Resources.* Bureau of Resource Sciences and the Fisheries Research and Development Corporation, Canberra, Australia.

1994

JACOBS, T.A., J.D. KOEHN, T.J. DOEG & B.W. LAWRENCE, 1994. Environmental experience gained from operation of reservoirs in the Murray-Darling Basin, Australia. *In*: Proceedings of the 18th congress of the International Commission on Large Dams. Held in Durban, South Africa, December 1994. pp 561-587.

KOEHN, J. 1994. The cod story. *In*: *The Geomorphology and Biology of Streams.* Proceedings of the River Basin Management Society Summer Conference Held at La Trobe University , Melbourne. 5 December 1994.

KOEHN, J.D., N.A. O'CONNOR & P.D. JACKSON, 1994. Seasonal and size-related variation in microhabitat use of a small Victorian stream assemblage. *Australian Journal of Marine and Freshwater Research* **45**: 1353-1366.

1995

KOEHN, J.D. 1995. Conserving Australian freshwater fish: the way forward. Chapt 4, pp. 22-28 *In*: *People and Nature Conservation* ed. by A. Bennett, G. Backhouse and T. Clark. Transactions of the Royal Society of New South Wales (Surrey Beattie & Sons).

KOEHN, J.D. 1995. Native Freshwater Fish: Risks and Threats. *In*: *Willows, weeds and Native Fish,* proceedings of the River Basin Management Society Summer Conference, November 20 1995.

KOEHN, J.D. 1995. Boat electrofishing in inland waters. *In*: *Proceedings of the Electrofishing Development Workshop held in Canberra 28-31 March 1995.* Cooperative Research Centre for Freshwater Ecology.

KOEHN, J.D. & T.A.RAADIK, 1995. Flora and Fauna Guarantee Action Statement No. Barred Galaxias *Galaxias olidus* var. *fuscus.* Department of Conservation and Natural Resources: Victoria.

KOEHN, J.D., T.J. DOEG, D.J. HARRINGTON &. G.A. MILLEDGE, 1995. The effects of Dartmouth Dam on the aquatic fauna of the Mitta Mitta River. Report to the Murray-Darling Basin Commission.

1996

JACKSON, P.D., J.D. KOEHN, M. LINTERMANS & A.S. SANGER, 1996. Family Gadopsidae. Freshwater blackfishes. Pp. 186-190 *In*: R.M. McDowall (ed.) *Freshwater Fishes of South-eastern Australia*. (Reed: Sydney).

KOBAYASHI, T., P. GIBBS, P.I. DIXON & R.J. SHIEL, 1996. Grazing by a river zooplankton community: importance of microzooplankton. *Mar. Freshwat. Res.* **47**: 1025-1036.

KOEHN, J.D. 1996. The key criteria to sustaining the wild stock Murray cod fishery in Lake Mulwala. In: D.A. Hancock & J.P. Beumer (eds) Proceedings of the Second World Fisheries Congress (Volume 1) *Developing and Sustaining World Fisheries Resources: The State of Science and Management.* Bribane July 1996.

KOEHN, J.D.1996. Habitats and movements of freshwater fish in the Murray-Darling Basin. pp 27-32 in: Proceedings of the Murray-Darling Basin Commission Riverine Environment forum. October 1995, Atwood, Victoria. (Murray-Darling Basin Commission)

KOEHN, J.D., T.J. DOEG, D.J. HARRINGTON & G.A. MILLEDGE, 1996. Dartmouth Dam: effects on the downstream aquatic fauna. pp 49-56 in: Proceedings of the Murray-Darling Basin Commission Riverine Environment forum. October 1995, Atwood, Victoria, October 1995. (Murray-Darling Basin Commission)

RAADIK, T.A., S.R. SADDLIER & J.D. KOEHN, 1996. Threatened fishes of the world: *Galaxias fuscus* Mack, 1936 (Galaxiidae). *Environmental Biology of Fishes* **47**: 108.

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